

VEZIO COTTARELLI - CINZIA FORNIZ (*)

RICERCHE ZOOLOGICHE DELLA NAVE OCEANOGRAFICA
"MINERVA" (C.N.R.) SULLE ISOLE CIRCUMSARDE. XXIII.

MEIOPSYLLUS MARINAE: A NEW GENUS AND
A NEW SPECIES OF PARAMESOCHRIDAE
FROM THE MEIOBENTHOS OF ASINARA AND
S. PIETRO ISLANDS (SARDINIA)

(CRUSTACEA, COPEPODA, HARPACTICOIDA)

From 1985 till now a team of Italian researchers coordinated by Prof. B. Baccetti of the University in Siena has carried out a series of zoogeographical expeditions to the small circumsardinian islands by use of the C.N.R. oceanographic ship "Minerva" (BACCETTI *et al.*, 1989). The research was later extended to other small Italian and Greek islands by use of the oceanographic ships "Bannock" and, recently, "Urania".

The interstitial fauna of the marine and subterranean habitats of these small Italian islands had not been explored yet. Due to these expeditions a great deal of material, partly already studied, was collected (COTTARELLI & VENANZETTI, 1989; FORNIZ *et al.*, 1990; COTTARELLI & FORNIZ, 1991; COTTARELLI & FORNIZ, 1993).

This paper deals with the description and discussion of a new genus and a new species of Paramesochridae that we consider particularly interesting from a systematic, faunistic and ecological point of view (cfr. BACCETTI *et al.*, 1990). This is the first paper devoted to the numerous Paramesochridae collected during these research expeditions and which are presently under examination.

(*) Dipartimento di Scienze Ambientali, Università della Tuscia, Viterbo, Italy.

PARAMESOCHRIDAE LANG

Meiopsyllus n.gen.

DIAGNOSIS - Paramesochridae with: A1 8-segmented in female and 7-segmented in male; exopod A2 1-segmented; mandible without exopod; P1 with 2-segmented exopod and without endopod; P2-P3 with 3-segmented exopod and without endopod; P4 with 3-segmented exopod and 1-segmented endopod; P5 confluent in both sexes, with distinct exopod in female; caudal rami longer than the last 2 abdominal somites combined.

DERIVATIO NOMINIS - The generic name *Meiopsyllus* is a combination of the greek terms "meios" (=small, minor) and "psylla" (=flea).

REMARKS - The main diagnostic feature of *Meiopsyllus* n.gen. is the complete lack of endopod P1, a reduction not found in any other Paramesochridae thus far.

The new genus belongs to the subfamily Paramesochrinae as defined by HUYS (1987). The author identifies two branches in the subfamily: the *Scottopsyllus* group, which represents the plesiomorphous branch, and the *Paramesochra* group, which represents the apomorphous branch. *Meiopsyllus* n.gen. seems to have those features that, according to Huys, identify the apomorphous branch, i.e. the unisegmented condition in exopod of antenna and in exopod of mandible. Actually, in this genus the exopod of the mandible is absent.

Within the *Paramesochra* group, the new genus seems to belong to the *Kliopsyllus-Kunzia* lineage, defined by the following apomorphies: 1) endopod P2-P4 unisegmented 2) exopod P1 with 4 setae on distal segment 3) distal segment of exopod P4 with 3 setae (Huys, 1987). We would like to point out that *Meiopsyllus* n.gen. seems to be part of the evolutionary trend already observed in *Kunzia* (Huys, 1987). In fact, in the last genus the endopod P1 seems to be already strongly reduced and unarmed; in the new genus this appendage is completely lacking. Nevertheless, *Kunzia* shows an unisegmented exopod P1, while this appendage is 2-segmented in the new genus. On the other hand, a 2-

segmented exopod P1 seems to be a condition that has evolved convergently within the family of Paramesochridae.

The morphology and the armature of legs P2-P4 in *Meiopsyllus* n.gen. are rather similar to those of the corresponding legs in *Leptopsyllus* T.Scott, a genus placed in the *Scottopsyllus* group by HUYS (1987). These similarities, however, are not regarded as an indication of common ancestry, yet are considered here as the result of parallel evolution related to the colonization of the interstitial habitat.

We think that the new genus too underwent the paedomorphic phenomena previously supposed by HUYS (1987) for the evolution of Paramesochrinae. The reduced size and the noteworthy tendency to the reduction and the exemplification of various appendages give *Meiopsyllus* n.gen. a kind of habitus that is already been observed in highly specialized Paramesochridae (KUNZ, 1981). Hence the new genus could be included in the "morphological series with increasingly pronounced larval characters" as stated by HUYS (loc.cit.) in relation to certain taxa of the *Scottopsyllus* group.

***Meiopsyllus marinae* n.sp.**

MATERIAL - 30 females, 20 males, 2 copepodites collected (M.Cobolli Sbordoni, V. Cottarelli, E. De Matthaieis leg., 9 September 1987) on Cala Arena seashore (Asinara island, northwestern Sardinia). 14 females, 13 males, 3 copepodites collected (M.Cobolli Sbordoni, V. Cottarelli, E. De Matthaieis leg., 1 August 1986) on the seashore near Punta Martin (S. Pietro island, southwestern Sardinia).

TYPES - HOLOTYPE: a female from Asinara island mounted on a slide labelled *Meiopsyllus marinae* ht. Paratypes: 30 females, some ovigerous, and 20 males, also mounted on slides labelled *M.marinae* pt. and numbered from 2 to 50, with the indication of the sampling sites. The type-series and the remaining material preserved in alcohol are temporarily stored in the senior author's collection at the Dipartimento di Scienze Ambientali, Università della Tuscia - Viterbo.

DERIVATIO NOMINIS - The new species is dedicated to our colleague, Prof. Marina Cobolli Sbordoni, who took part in these zoogeographical expeditions and often helped us collecting interstitial samples.

DESCRIPTION OF THE HOLOTYPE - Body (fig.1b) elongate and cylindrical, slightly depressed dorsoventrally, tapering posteriorly. Cephalothorax, caudal rami and all somites, with the exception of the last two, bearing sets of dorsal pores and chitinous thickenings, whose distribution patterns is shown in fig.1b. Body colourless, nauplius eye not observed. Length, measured from the apex of rostrum to distal margin of caudal rami: 0.215 mm. Cephalothorax slightly longer than following three somites combined. Rostrum diminutive, conical, fused with dorsal cephalic shield and without any sensillae.

Genital somite longest, without any sign of subdivision. Anal somite shortest, ventral hind edge with a set of setules. Anal operculum convex, smooth.

Caudal rami (fig.2d) slightly divergent, about 2.5 times as long as maximum width and longer than last 2 somites combined. Dorsal surface with two longitudinal chitinous ridges. Armature represented by 1 proximal dorsal seta near the outer lateral margin; 1 longer distal dorsal seta near the inner lateral margin, that is provided with some spinules; 1 strong and plumose subapical seta near the outer distal corner; principal apical seta long and slender, accompanied with 1 outer plumose seta and 1 inner smaller seta.

Antennule (fig.2g): 8-segmented, strong and short. First segment longest, anterior margin with 4 spinules. Second segment with 5 slender setae along the anterior margin and 1 longer dorsal seta. Third segment with 5 slender setae and 1 short, spinulose seta along the anterior margin. Inner distal corner of the fourth segment forming a sub-cylindrical processus provided with a long and slender aesthetasc and 1 slender seta, which are confluent at the base. Fifth segment with a long and slender seta on the anterior distal corner. Sixth segment with 2 distal setae. Seventh segment smallest, with 1 seta. Eighth segment small, furnished with 8 distal setae.

Antenna (fig. 3h): basis elongate, slightly widening distally, without armature. Exopod 1-segmented, sub-cylindrical, with 1 seta at about half the length of inner margin and 1 strong spatulate and apically

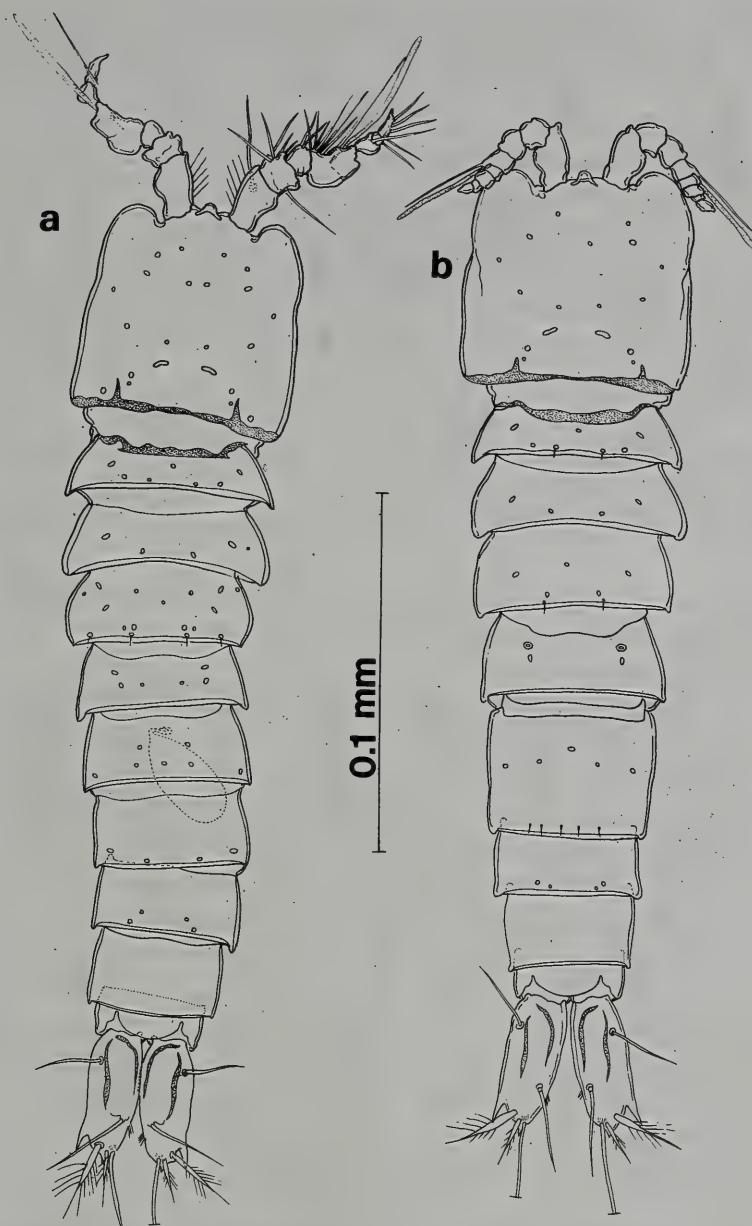


Fig. 1. *Meiopsyllus marinae* n.gen. n.sp. Female holotype: b. Male paratype: a.
a: habitus; b: habitus.

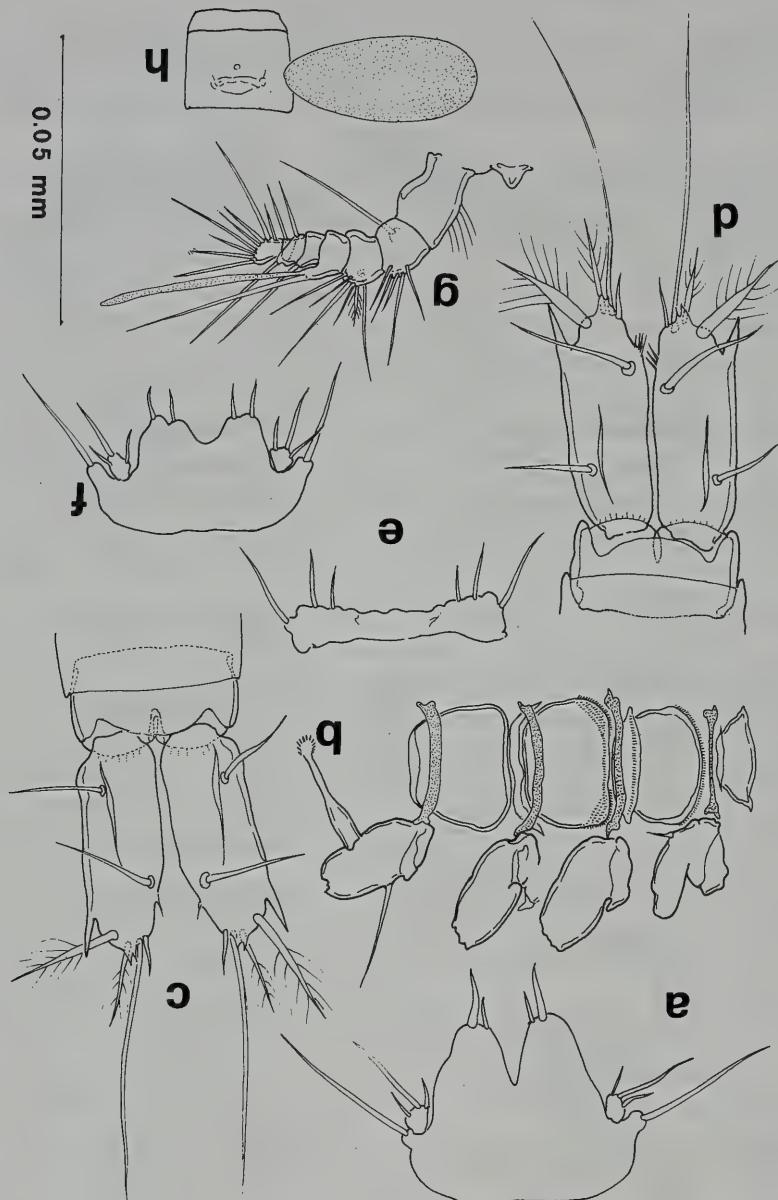


Fig.2. *Meiopsyllus marinae* n.gen. n.sp. Female holotype: a, b, d, g, h. Male paratype: c, e, f.
 a: P5; b: intercoxal plates; c: caudal rami; d: caudal rami; e: P6; f: P5; g: antennule;
 h: genital somite with egg.

spinulose seta. First segment of endopod shortest, without armature. Second segment with 4 distal geniculate setae, 4 distal spinulate setae and 1 subdistal spinulate seta.

Mandible (fig. 3g): palp well-developed. Coxa-basis long and narrow, without armature. Non exopod. Endopod 2-segmented; segments short, approximately of the same length. First segment with 1 short distal seta; second segment with 4 distal setae.

Maxillula (fig. 3m): arthrite of praecoxa with 3 strong apical spines, accompanied by 2 slender subapical setae. Coxal endite cylindrical, with 2 setae apically. Endite of basis extending beyond coxal endite, with 3 apical setae and 1 subapical smaller seta. No exopod. Endopod small, sub-conical, with 2 short apical setae.

Maxilla (fig. 3l): syncoxa with 2 endites. Proximal endite with 1 seta; distal endite with 2 setae. Basis drawn out into a strong claw. Endopod apparently 1-segmented, with 2 slender setae and 1 stronger seta.

Maxillipede (fig. 3a): basis approximately as long as 1.6 maximum width, without armature. Endopod 2-segmented; first segment longest, about 2.5 as long as maximum width, without any spinules or hairs; second segment short, with 1 spinule and 3 distal geniculate setae.

P1 (fig. 3b): coxa short, with a set of small and short spinules on the outer distal corner. Basis narrow and elongate, with 1 proximal seta at about 1/3 the length of inner margin. Exopod 2-segmented; each segment with row of spinules along outer margin. Proximal segment longer than distal one, with 1 seta on the outer distal corner; distal segment widening distally, with 2 subapical outer setae and 2 apical geniculate setae. No endopod.

P2-P3 (fig. 3c,d): basis elongate, with 1 dorsal seta near outer margin. Exopod 3-segmented; each segment furnished with a row of spinules along the outer margin and 1 strong seta on the outer distal corner. First segment longest, with 3 longer spines near the inner distal corner; second segment forming spinous and curved projection at the inner distal corner; third segment with 2 apical setae; the inner one longest and geniculate. No endopod.

P4 (fig. 3e): basis elongate, with 1 slender seta on outer proximal margin. Exopod 3-segmented, each furnished with a row of spinules

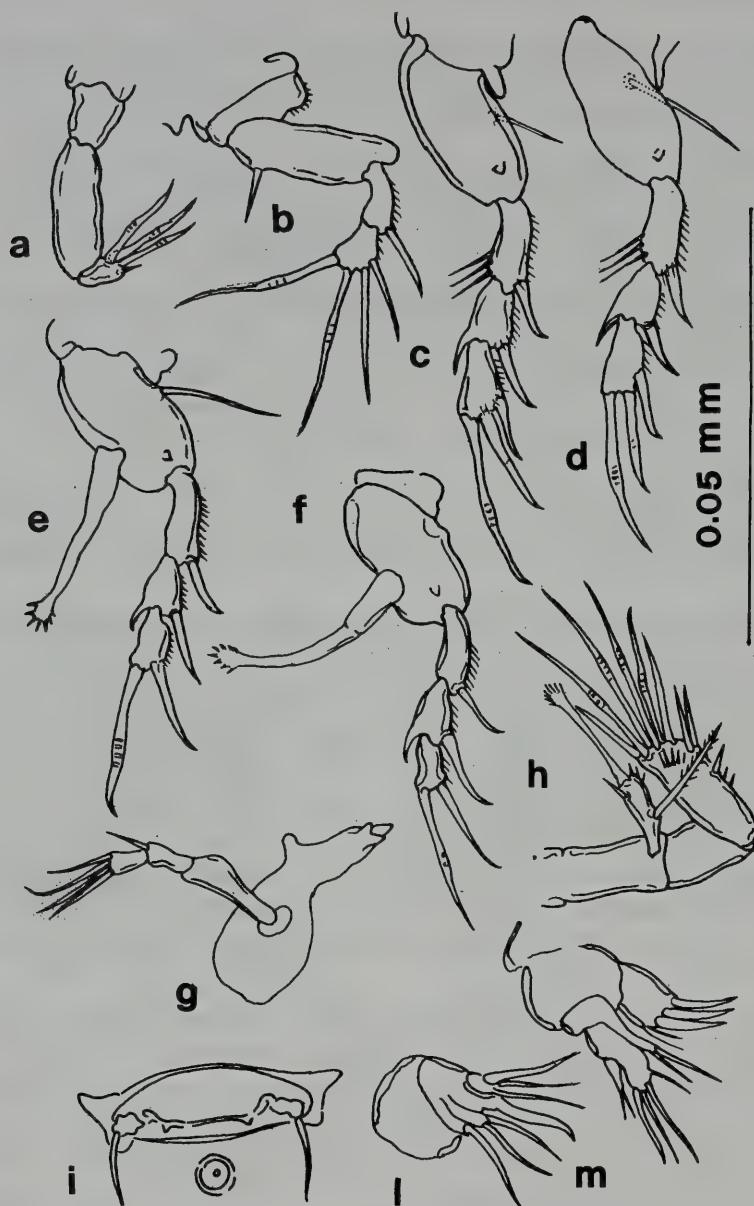


Fig.3. *Meiopsyllus marinae* n.gen. n.sp. Female holotype: a, b,c,d, e, g, h, i, l, m. Male paratype: f.

a: maxilliped; b: P1; c: P2; d: P3; e: P4; f: P4; g: mandible; h: antenna; i: genital complex; l: maxilla; m: maxillula.

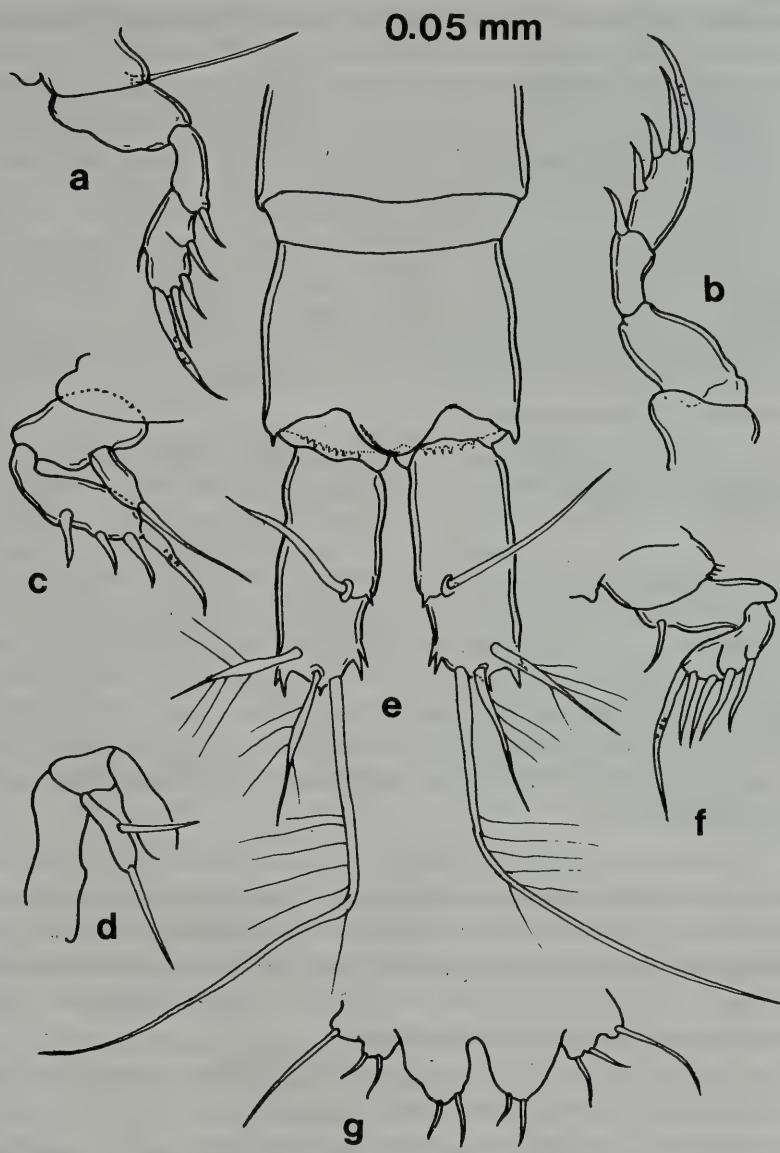


Fig.4. *Meiopsyllus marinae* n.gen. n.sp. Copepodite (seven-somites stage): a, b, c, d, e, f, g.
a: P3; b: P2; c: P4; d: antenna; e: caudal rami; f: P1; g: P5.

along the outer margin. First segment longest; second segment forming spinous and curved projection at inner distal corner. First and second segment each with 1 strong seta on outer distal corner; third segment with 2 distal setae, the inner one geniculate and longer. Endopod 1-segmented, narrow and slender, with clavate and spinulose apex.

Intercoxal plates P1-P4 as shown in fig. 2b. Intercoxal plates P2-P3 furnished with fine spinules near the distal margin.

P5 (fig. 2a): baseoendopods confluent, forming a large plate extending just beyond exopods, each with a long and slender seta lateral to exopod. Baseoendopodal plate strongly bilobed at distal edge; each lobe with 1 short inner seta and 1 longer outer seta. Exopod small, distinct, sub-quadrangular in shape, with 3 slender setae, the middle one the longest.

Genital complex (fig. 3i): P6 forming a small transverse plate, bilaterally furnished with 1 seta, just inside the outer corner.

DESCRIPTION OF THE MALE - General body shape similar to that of female (fig. 1a). Length, measured from apex of rostrum to distal margin of caudal rami: 0.210 mm. Antenna, oral appendages, P1, P2 and P3 similar to that of female; caudal rami not sexually dimorphic with the exception of the set of spinules along inner margin, that is replaced by 1 spinule. Cephalothorax, caudal rami and all somites, with the exception of the last two, bearing dorsal sets of pores and chitinous thickenings.

Antennule (fig. 1a): 7-segmented, subchirocer; first and fourth segments longest; sixth segment shortest. Seventh segment claw-shaped. Fourth segment swollen, furnished with an aesthetasc, longer than the female's one and accompanied by 1 seta, also long and slender; anterior margin forming a concave depression in which the fifth segment articulates (subchirocer apparatus).

P4 (fig. 3f): endopod differs from the corresponding leg of female because it is curved and slightly longer.

P5 (fig. 2f): baseoendopods similar to the female's ones but the plate lobes are much less developed; furthermore, the lobes are furnished with 2 almost identical setae.

P6 (fig. 2e): confluent along median line forming a narrow and

transversally elongate plate, provided with 1 slender seta on each outer distal corner; distal margin with 2 pairs of setae, the outer the longest.

DESCRIPTION OF COPEPODITE - We deem it useful describe and discuss also some features of a copepodite in the seven-somites stage.

Antenna (fig. 4d): exopod similar to that of the adult, but the apical seta is simple and does not bears any spinules near its insertion.

P1 (fig.4f): basipod as in adult; exopod with a sign of articulation between the second and the third seta of the outer lateral margin. Such an articulation does not correspond to the adult condition where the segment boundary is located between the first and the second seta of outer lateral margin.

P2-P3 (fig.4b,a): still with 3-segmented exopod.

P4 (fig.4c): endopod represented by 1 segment with 1 seta and differing from the corresponding leg of the adult. Exopod still 1-segmented, furnished with 4 setae as in adult.

P5 (fig.4g): exopods not well-developed yet, each bearing only 2 setae. The endopodal lobes are smaller, but already provided with 2 setae as in the adult.

Caudal rami (fig.4e): the morphology is already somewhat similar to that of the adult. Nevertheless, the dorsal proximal seta and the dorsal longitudinal lamina are missing and the strong pointed tip on the outer distal corner is represented by a shorter bifid projection.

REMARKS ON THE SAMPLING SITES - *Meiopsyllus marinae* n.sp. has been collected in interstitial marine waters. Both Cala Arena (Asinara island) and Punta Martin (S.Pietro island) seashores are characterized by very fine grained sand.

In Asinara island, together with *M.marinae* n.sp., that is very abundant, few specimens of *Kliopsyllus* sp., *Scottopsyllus* sp. and *Apodopsyllus* sp. (Paramesochridae family) were found. Furthermore, in the sampling site *Psammopsyllus maricae* Cottarelli, 1983, *Arenopontia* cfr. *subterranea* Kunz, 1937 (cfr. COTTARELLI & VENANZETTI, 1989); *Psammastacus* sp. and Laophontidae ind. were also present.

In S.Pietro island together with the new species *Kliopsyllus* sp.,

Apodopsyllus sp. and *Arenopontia subterranea* Kunz, 1937 were also been collected.

Most of these species are characterized by a reduced size and a slender, elongate body: so they show a high specialization to live in very fine grained sand. It is interesting to point out that *M. marinae* n.sp. seems to have a K-breeding strategy. In fact, among the numerous ovigerous females observed, just a few had 2 eggs while the most remaining ones had only one big egg (fig. 2h).

REFERENCES

BACCETTI B., COBOLLI SBORDONI M. e POGGI R., 1989 - Ricerche zoologiche della nave oceanografica "Minerva" (C.N.R.) sulle isole circumsarde. I. Introduzione - *Ann. Mus. civ. St. nat. Genova*, **87**: 127-136.

BACCETTI B., CALLAINI G., ARGANO R., BIONDI M., COBOLLI SBORDONI M., COTTARELLI V., MEI M., UTZERI C., VIGNA TAGLIANTI A., POGGI R., MINELLI A., BOLOGNA M., OSSELLA G., MANICASTRI C., LANZA B. and BACCETTI N., 1990 - Zoogeographical expeditions of the C.N.R. ship "Minerva" around the small circumsardinian islands: a synthesis - In: Biogeographical aspects of insularity. *Atti dei Convegni Lincei, Acc. Naz. Lincei*, Roma, **85**: 521-532.

COTTARELLI V. e VENANZETTI F., 1989 - Cylindropsyllidae del Meiobenthos di Montecristo e delle isole circumsarde (Crust., Cop., Harpact.) - *Ann. Mus. civ. St. nat. Genova*, **87**: 183 - 235.

COTTARELLI V. and FORNIZ C., 1991 - Laophontidae from the meiobenthos of some circumsardinian islets: *Echinolaophonte armiger typica* and *Echinolaophonte minuta* n.sp. - *Ann. Mus. civ. St. nat. Genova*, **88**: 665-676.

COTTARELLI V. e FORNIZ C., 1993 - Due nuove specie di *Nitocrellaopsis* Petkowki (Crust., Cop., Harpact.) di acque freatiche delle isole di Kos e Tylos (Sporadi Meridionali) - *Fragm. entomol.*, Roma, **24** (2): 131-145.

FORNIZ C., COTTARELLI V. and VENANZETTI F., 1990 - First records of phreatic Harpacticoids from some Aegean Islands. *5th Congress on the Zoogeography and Ecology of Greece and adjacent regions*. Iraklion, Crete: 65 -66.

HUYS R., 1987 - *Paramesochra* T. Scott, 1892 (Copepoda, Harpacticoida): a revised key, including a new species from the SW Dutch coast and some remarks on the phylogeny of the Paramesochridae - *Hydrobiol.*, Dordrecht, **144**: 193-210.

KUNZ H., 1981 - Beitrag zur Kenntnis mariner Copepoda Harpacticoida (Fam. Paramesochridae Lang) mit Beschreibung zweier neuer Arten und einer neuen Unterart - *Crustaceana*, Leiden, **62** (1): 85-97.

RIASSUNTO

Meiopsyllus marinae: un nuovo genere ed una nuova specie di Paramesochridae (Crustacea, Copepoda, Harpacticoida) del meiobenthos delle isole di Asinara e S. Pietro (Sardegna).

Nel lavoro si presentano la descrizione e discussione di *M. marinae* n.gen. n.sp., raccolto nelle acque interstiziali marine delle isole di Asinara e S.Pietro (Sardegna). Il nuovo taxon è caratterizzato principalmente da: antennula di 8 articoli nella femmina e di 7 articoli nel maschio; esopodite dell'antenna uniarticolato; P1 con esopodite di 2 articoli ed endopodite assente (l'assenza dell'endopodite P1 non era mai stata riscontrata finora nei Paramesochridae); P2 e P3 con esopodite di 3 articoli ed endopodite assente; P4 con esopodite di 3 articoli ed endopodite uniarticolato; P5 fusi nei due sessi; rami caudali più lunghi degli ultimi due segmenti dell'urosoma.

Nel lavoro sono inoltre presentate alcune osservazioni sulla sistematica, le affinità e l'ecologia del nuovo taxon.

SUMMARY

Description and discussion of *M. marinae* n.gen. n.sp., collected in marine interstitial waters of two circumsardinian islands. The new genus is mainly characterized by the lack of endopod P1, a reduction not found in any other Paramesochridae thus far. Some remarks on the systematics, the affinities and the ecology of the new taxon are also given.